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# GLAST Monthly PSR

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**Spacecraft**

Nov. 6 – Dec. 5, 2003

***Joy Bretthauer***  
*Observatory Manager*

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# Overview

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## ► Accomplishments

- GFE/Deliverables
- CDRL library tool
- EMI/EMC Test Requirements
- Factory of the Future
- S/C Subsystems

## ► Issues

- CDR: Requirements, impacts from LAT I Flexures/CLA, ISMP, Ku-band
- EMI
- Simulators/harness
- Solar Array Recommendations
- LAT Power
- Parts: cPCI connectors, Rad750

## ► Upcoming Meetings

## ► Rolling Wave Schedule



# Accomplishments

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## ▶ GFE/Deliverables

- ▶ Delivered GBM FEM (NaI & BGO), LAT FEM 10.06 (for Obs. Strength analysis), and GBM Thermal model to Spectrum
- ▶ Issue: GBM FEM model checks performed prior to release to Spectrum did not identify components occupying same volume.
- ▶ Action: Review model check process w/ Mechanical leads.

## ▶ CDRL Library Tool

- ▶ Library data base: population in-progress
- ▶ Testing of modules to facilitate CDRL reviews: in-progress



# Accomplishments

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## ▶ EMI/EMC Test Requirements

- ▶ Reviewed EMI/EMC req'ts w/Fred Huegal and obtained recommendations
- ▶ Finalized EMI/EMC req'ts (Fred Blanchette, Joe Chott, Kendall Nii, Joy Bretthauer) and received ROM for CCR; additional charts/graphs available with CCR to complete existing requirement
- ▶ Current CCR does not include Ku-band impacts; these will be identified under Ku-band mod

## ▶ Factory of the Future:

- ▶ Received Specs & SOWs for FoF facilities from Spectrum



# Accomplishments:S/C Overview

- ▶ **Spectrum Astro Successfully achieved SEI/SMM (Level 3) Rating from Software Productivity Consortium**
- ▶ **C&DH:**
  - ✓ **Testing Completed: Non-volatile Memory engineering model (EM) 1board**
  - ✓ **Completed assembly: NVM EM 2, ARM, IPCU EM 1, PACI EM 1, GDE EM 1 & 2, and PDE EM1 boards**
- ▶ **CDR Peer Review Outlines: on-track, in-progress**
- ▶ **Detailed schedule is being updated to analyze impacts due to Ku-band, instrument delivery, launch, ISMP, etc.**
- ▶ **Flight S/W Code Walkthroughs for baseline began 12/4/03; ( ISMP will result in significant new code development & testing, also impacts existing code)**
- ▶ **Cable Mock Up drawings nearing release (structures group)**



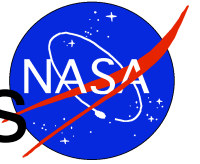
# Accomplishments: S/C Subsystems

## Instrument Interfaces

- LAT & GBM ICDs updated & routed for signature
- GBM High Voltage cables: shipped 11/21/03
- GBM Internal ICD reviewed
- Tim Morse to attend GBM CDR for PSB & Detectors 12/10-11
- Issue: GBM Detector radiator sizing, view factors & survival power – thermal model is being analyzed, results on or before Monday 12/8

## ▶ LAT & GBM SIIS/SDIS Status

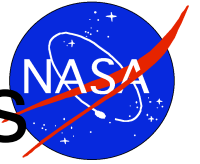
- Limited in-stock simulator parts and long lead times (LVDS module) require creative solutions and delivery prioritization to address LAT & GBM delivery dates for 2<sup>nd</sup> simulator
- LAT as priority: delays delivery for GBM until new parts are received
  - a) Use SIIS from NRL w/LVDS, finish testing, add 1PPS, deliver to LAT; In-stock parts for 2nd SDIS
  - b) Use in-stock parts, pull LVDS board from NRL SIIS (delivery closer to LAT need date) or order LVDS (long lead part would impact final SIIS delivery beyond January), add 1PPS, deliver to LAT



# Accomplishments: S/C Subsystems

## LAT & GBM SIIS/SDIS Status (cont'd)

- GBM as priority: delays delivery of LAT until new parts are received
  - a) Build & deliver with in-stock parts: 3-4 weeks delivery; places LAT at risk of late parts receipt & delayed delivery (February/March)
  - Action: Spectrum will chart options with delivery dates
- LAT Test Harness: Flight connectors will be used to build harness & be delivered fully-tested with simulator ASAP; late definition delayed harness entry into manufacturing; harness build is now competing with other high priority programs



# Accomplishments: S/C Subsystems

## ► Thermal

- GBM Thermal Analysis: Used updated NaI & BGO models to re-run analysis to identify if radiator sizing issues still exist with updated models; results due on or before 12/8/03
- STOP: Cycle 1 complete; Cycle 2 – Combined old LAT model with latest s/c model, runs & results will be available on or before 12/8/03 (were not available as of Spectrum's MPSR)

## ► GNC

- S/C Simulator H/W: successful operation & interfaces tested
- Simulation: Code generated for a significant portion of sim
- 2 of 3 Swift heritage, build to print, Star Trackers (ST) for GLAST failed vibe at vendor (General Dynamics)
- 1 ST failure due to workmanship-improper chip bonds;
- 2nd ST failure is being investigated, could not reproduce failure after power cycled
- 3<sup>rd</sup> ST: successful vibe & TVAC test results





# Accomplishments: S/C Subsystems

## ► Telecom

- Revised PFSs for S-Band Antenna Switch, S-Band Antenna
- Revised PFS & SOW for Ku-band Transmitter, Ku-band Antenna
- Reviewed UDL Designs for TDRSS & GN Links (ECR in progress)
- Issue: Require Definition of EMI/EMC Test Requirements

## ► Structural

- Primary Structure: Running model checks on LAT 10.06 FEM
- Secondary Structure: Completed model checks on GBM NaI & BGO detectors;
  - Elements at Radiator Attach Ring Occupy Same Volume as Housing



# Accomplishments: FoF

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▶ FoF Readiness Review Plan: (see chart #72 SAI Dec. MPSR)

- Internal Facility reviews (1 of 2) at Spectrum (TVAC, I&T, Safety, Quality, Security, and EMI/EMC) took place over the past month;
- Spectrum's internal Integrated FoF review is scheduled for 1/30/04
- Spectrum to determine format and date for GLAST FoF readiness review format ; goal is to have it well before flight structure qualification
- Initial Draft of Capabilities Document to be released 1<sup>st</sup> week December
- FoF Certification/Acceptance Plan
  - TVAC Chamber: 1/27/04 to 2/26/04
  - Acoustics Chamber: 1/27/04 to 2/9/04
  - EMI/EMC Chamber: 1/14/04 to 4/29/04
  - Clean Room: Certification by outside 3<sup>rd</sup> party; 1/2/04 to 1/23/04
  - Crane Proof Load: Arizona Dept. of Weights & Measures to conduct Proof Load Tests; 1/27/04 to 1/30/04



# Issues

- ▶ ***CDR Technical Baseline: assessing impacts due to ISMP, Ku-band, maturity of instrument models for flight build post-CDR, ...***
- ▶ ***36 SOW CDR requirements: 7 items are significantly affected by CLA/STOP results; 15 items are affected by ISMP***
- ▶ ***Cost/schedule/technical impacts may result from hardware build based on pre-mature instrument models. Prefer to proceed to hardware build based on true, CDR instrument & S/C models after final Coupled Loads Cycle is complete.***
  - *CLA cycles 1 & 2 are based on PDR-version of LAT FEM*
  - *At least 7 revisions of LAT FEM since PDR-version*
  - *Interface loads have increased 30%*
  - *Primary load path of LAT to S/C interface changed significantly*
  - *L/V CLA Forcing Functions are scaled, results not yet available*



# Issues

- ▶ **EMI/EMC Test Requirements:** CCR in review, direction to Spectrum for SSR by 12/10/02
- ▶ **RAD750:** radiation results in review, GLAST systems to contact JPL for more info on DEEP IMPACT failures; working group being formed to exchange processor info
- ▶ **Solar Array Diode Weld:** failed vibe test, currently checking each weld to determine cause of failure
- ▶ **Solar Array Atomic Oxygen Kapton Issue:** 2 mil baseline used for CDR; results of 5 mil to be presented; 5 mil incorporated into baseline after testing of coupons and qual program is outlined
- ▶ **Instrument Simulators/harness**
- ▶ **Independent Safe Mode Processor (ISMP) requirements:** due 12/5/03; requirements freeze next week
- ▶ **LAT Power:** CCR 183; Spectrum prefers to wait until after CDR to fully assess and make s/c power margin available to project; options to increase power are in review w/ Spectrum & GLAST power leads
- ▶ **Negotiations for proposals received over the past month (approx. 8 plus PDR slip & Ku-band)**
- ▶ **Hiatus period activities:** direction to Spectrum on-hold until detailed schedule is updated and analyzed to determine length of hiatus after impacts due to instrument delays, CDR slip, Ku-band, ISMP, and launch date are assessed
- ▶ **GPS Antenna:** per GLAST systems, working solution with Spectrum to extend lifetime due to thermal CTE mismatch
- ▶ **LAT Data Rate Increase:** additional memory modules can be added to SSR; ground systems & operational impacts under review



# UPCOMING SUBSYSTEM OR INTERFACE MEETINGS

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- ▶ **Jan 2004**      ***Power Bus Short Mini-Peer Review***
- ▶ **Dec 12**      ***Solar Array PDR at Emcore, POC Robb Pinkerton***
- ▶ **Dec 10-11**    ***GBM NaI, BGO, PSB CDR, POC Tim Morse***
- ▶ **Dec 16**      ***APM TIM at MOOG, POC Igor Lazbin***
- ▶ **Late Jan, 2004**      ***Propulsion Subsystem CDR @ ARC, POC Scott Capehart***
- ▶ **Jan 15, 2004**      ***SSR CDR at SEAKR, POC Nick Gaudio***
- ▶ **Jan 22, 2004**      ***SIRU CDR (DDR), POC Igor Lazbin***

## Subcontract Review Rules of Engagement

We Can Discuss Requirements Compliance and Clarifying Questions  
We Can Not Direct Outside of the Subcontract  
We Can Not Ask for Design Alternatives



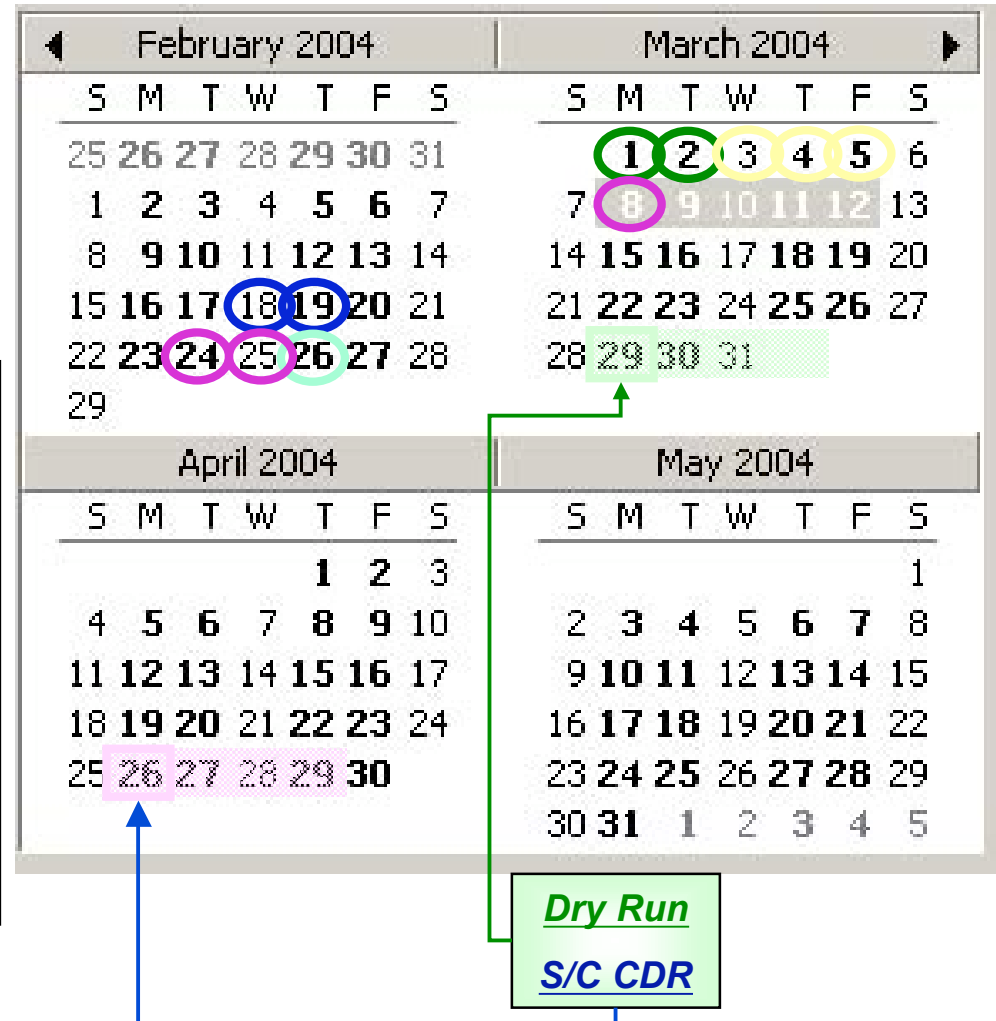
# PROPOSED PEER REVIEW AND CDR SCHEDULE (See Spectrum's Dec. MPSR chart #6)

## ► Move CDR From Week of 2/9 to 4/26 (11 Week Slip)

- Peer Reviews Slip 13 Weeks

## ► Peer Review Color Code

- Systems Peer Review, I&T Peer Review
- Structures Peer Review, Mechanisms Peer Review,
- Thermal Peer Review
- EPS Peer Review, RF Comm Peer Review
- C&DH Peer Review, GN&C Peer Review, FSW Peer Review (FSW CDR)
- Propulsion Peer Review (Subcontractor CDR) [1/20/04 TBD]
- Added Fault Protection Peer Review

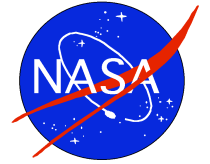


Bus I&T Start 10/25/04 – Need GPO Permission to Order Hardware after Peer Reviews



# Rolling Wave Schedule

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***Next Month's Schedule will more accurately reflect changes due to Ku-band, instrument delivery date changes, launch, ISMP, and CDR slip***